

## *Chapter 7*

# **New Combination Alternatives**

## **Salt Pond / Shipping Channel / Canals / Desalting Facility**

This proposal was prepared by Metcalf and Eddy, San Diego, California, dated September 8, 1997, and sent to Los Alamos National Laboratory at the request of Mr. Patrick Quinlan of Congressman George Brown's office. This alternative is to construct a navigable canal between the Gulf of California and the Salton Sea.

This proposal is essentially a pump-out/pump-in scheme using ocean water (alternatives 2 and 12 on table 2 and in chapter 8) with costly facilities added that provide enhancements not related to desalting the Salton Sea. The alternative appears possible at this low level of design. This should not be taken to mean that all facilities have been noted and that the stated operation is complete.

One difference between this alternative and the other alternatives of this study is that it uses canals. The current pre-appraisal design did not. This report discusses using canals (see chapter 5, Pump-Out/Pump-In), which have a high probability of reducing costs.

With time, the assumptions that any study uses to estimate the future Sea salinity would change. The assumptions the Metcalf and Eddy proposal used would yield better results than the assumptions that the remainder of this report used.

While the current low level of design pays little attention to detail, the high point on the profile is usually important. The Metcalf and Eddy proposal indicates the high point of this particular route would be at an elevation of 82 feet m.s.l. Topographic maps indicate this elevation to be closer to 140 feet m.s.l. This would increase the required excavation over what the proposal uses. Other pump-out/pump-in alternatives use a different route that does have a maximum elevation of 82 feet m.s.l.

The diking and desalinization plant that the proposal uses would be similar to dikes and plants discussed elsewhere in this report and would also have

similar problems and costs. The proposal also contradicts itself, as it states that a desalting plant would be built to provide drinking water to MWD and others, and then later states that the desalinated water would flow into the Salton Sea to maintain its level. If the desalted water is not put into the Sea, the desalting plant portion of the proposal does nothing to improve the salinity of the Sea.

The pump-out canal will discharge into the large canal section during low tides only. The timing and operation of the canal between the Salton Sea and the point of discharge is critical and should be investigated completely. The volumes of water transfer in the locks and the timing of this transfer are also critical.

## **Gulf of California Pump-In / Pump-Out / Diking / Treating Inflows**

This proposal was faxed, dated August 10, 1998, to the Salton Sea Authority by U.S. Filter. It includes a combination of diking to control salinity concentration, pumping to and from the Gulf of California to stabilize elevation and treating the agricultural inflows. No quantities were provided for evaluation, and specific information was not provided. However, this proposal is very similar to alternatives discussed in Chapter 5, Pump-Out/Pump-In and alternative 33 in the September 1997 report, proposed earlier by U.S. Filter.

As discussed in chapter 2, page 14, large quantities of water, requiring large infrastructure, are needed to reduce the salinity of the Sea. Information provided indicates that a desalting plant or nanofiltration plant would be built on the Alamo River to provide recycled water for agriculture and other purposes. This would reduce the inflow of relatively fresh water to the Salton Sea, making the salinity problem worse.

This proposal meets the criteria of salinity control, elevation stabilization, and proven technology, but it would be one of the most expensive alternatives.

## **Phased Approach—Phase One: Salt Stabilized, Phase Two: Pump-In Later**

This proposal was submitted by Mr. Don Cox of Imperial Irrigation District at the public scoping meeting held in July 1998.

The goal of phase one is to stabilize the salinity of the Sea without dikes or brine ponds that might cause environmental concern. This would be economical and environmentally benign. It would take a 66-inch pipe, a pump, and a place to take the water. If needed, the 60-tons of salt per acre-foot of water could be concentrated to 200 tons of salt per acre-foot of water to reduce transportation costs. It appears that pumping 75,000 acre-feet per year out of the Sea would equal the salt load flowing into the Sea, which is included in the 1.346 million acre-feet per year. The 75,000 acre-feet of water pumped out of the Sea would not be a large enough quantity to cause secondary problems. This plan would be the quickest and simplest to implement, and time is certainly important. It would keep the Sea from deteriorating and allow the time to do the scientific studies for the final phase. In addition, the work would not be wasted as it would provide the outlet needed for any long-term solution. The outlet water going to Yuma is just one example of where the water might go.

Phase one is similar to Design Nos. 21 and 22 discussed on page 56. See these designs to understand the effect of this alternative. Phase two at a later date would receive water from one of the various sources discussed in “Pump-In Sources” on page 49.

## **Salt Concentrating Ponds**

David Butts of DSB Engineering suggested using salt concentrating ponds in his report to the Salton Sea Authority, dated October 1995. The two alternatives that came from this report would use ponds to concentrate Sea water, through evaporation, prior to pumping. Concentrating the flow means pumping less water, requiring smaller pipes and less pumping energy. There is a small increase in head caused by change in kinematic viscosity and unit weight of the water. Table 2 shows these costs of the in-Sea concentration Alternatives 37 and 38.

Alternative 38 is very similar to Alternative 37 but would use evaporation ponds on land near the Sea. Both Alternatives 37 and 38 are kindred to Alternative 9, and their cost can be compared to see the economics of concentrating the flows. They pump out 100,000 acre-feet per year from Point Loma. The ponds concentrate the pump-out discharge salinity from 44 ppt to 138 ppt and flow from 250,000 acre-feet per year to 100,000 acre-feet per year.

These alternatives use evaporation ponds with a minimum surface area of 45 square miles. Lower discharges or lower concentrations would require smaller ponds.

## **South End Off-Shore Dike**

The Screening Committee added this alternative during their meeting. It is similar to other in-Sea diked alternatives. The dikes are close to the Sea shore on the south half of the Sea. This proximity to the existing bank turns the path of New and Alamo Rivers entering the south end of the Sea into large, wide canals, as they flow around the impoundment to the north end of the Sea.

The dike, across the center of the Sea, will be designed to be earthquake proof. The dike around the perimeter, closest to the shore, will be designed as earthquake resistant. Several dikes, with gates, will extend from the impoundment to the shore which will form freshwater areas.

The large volume of water that these dikes enclose should allow for very long-term salt storage and eliminate the need for salt disposal during the 100-year project life. The freshwater areas will likely provide enhanced environmental benefits. The distance the impoundment dike will be from the shoreline should not detract from the Sea's esthetics.